202301UECM2453OE1a

Start again

Review of preview

Started on	Monday, 6 February 2023, 01:06 PM
Completed on	Monday, 6 February 2023, 01:06 PM
Time taken	16 secs
Grade	**0** out of a maximum of 10 (**0**%)

1

Marks: 1

Suppose that Y follows the stochastic differential equation

$$dY(t) = -2dt + 2dZ(t)$$

where Z(t) is a standard Brownian motion.
Let $X(t) = e^{5tY(t)}$. If

$$dX(t) = a[X(t),t]dt+b[X(t),t]dZ(t),$$

find a(3,1). _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 123.295837
Marks for this submission: 0/1.

2

Marks: 1

Assume that S(t) follows an arithmetic Brownian motion: $dS(t) = \alpha\, dt + \sigma\, dZ(t)$. If $d(35S^5(t) + 2t) = a[S(t),t]dt +b[S(t),t]dZ(t)$, find a(10,3) for $\alpha = 0.018000000000000002$ and $\sigma = 0.23$. _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 50017
Marks for this submission: 0/1.

3

Marks: 1

Let Z(t) be a standard Brownian motion. You are given:

- $R(t) = R(0)\, e^{-1.0t} + 0.072(1-e^{-1.0t}) + 0.33 \int_0^t e^{-1.0(t-s)} \sqrt{R(s)}\, dZ(s)$,
- $Y(t) = [R(t)]^3$.

Suppose that dY(t) = a[t, Y(t)]dt + b[t, Y(t)]dZ(t). Find dY(t) and hence calculate a(2, 0.15)/b(2,0.15). _____

Answer:

Make comment or override grade

Incorrect
Correct answer: -1.456816
Marks for this submission: 0/1.

4
Marks: 1

Stock prices follow geometric Brownian motion:

$$d\ln S(t) = 0.026dt + 0.12dZ(t).$$

Suppose S(0) = 49. Calculate P[S(3)<46). _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 0.3483
Marks for this submission: 0/1.

5
Marks: 1

You are given:

- $S(t) = S(0)e^{0.11t+0.32Z(t)}$
- $\delta = 0.04$
- $F_{t,T}$ is a forward on the stock.
- $r = 0.07$

d(ln F) follows the process $\alpha\, dt + \sigma\, dZ(t)$. Determine α. _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 0.08
Marks for this submission: 0/1.

6
Marks: 1

Let Z(t) be a standard Brownian motion. You are given that

$$^{-0.52t} + 0.33\int_0^t e^{-0.52(t-s)}dZ(s).$$

Let $X(t) = Y^3(t)$. Suppose

$$dX(t) = a(t, X(t))dt + b(t, X(t))dZ(t).$$

Find a(1,1). _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 5.0067
Marks for this submission: 0/1.

7
Marks: 1

Interest rates r(t) satisfy the SDE

$$dr(t) = 0.22(0.29-r(t))dt + 0.29[r(t)]^{0.5}dZ(t)$$

A solution for r(t) is

$$r(t) = A + (r(0)+B)e^{Ct}+De^{Et}\int_0^t e^{Ft}[r(s)]^{0.5}dZ(s)$$

where A,B,C,D,E and F are constants. Determine B+C+D+E+F. _____

Answer:

Make comment or override grade

Incorrect
Correct answer: -0.22
Marks for this submission: 0/1.

8
Marks: 1

Let S(t) be the time-t price of a nondividend-paying stock, you are given that the stock price process is

$$d[\ln S(t)] = -0.02005dt + 0.39dZ(t),\ S(0) = 3$$

where Z(t) is a standard Brownian motion under the true probability measure. Calculate $Cov(S^2(3), S^4(5))$. _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 17734980.32
Marks for this submission: 0/1.

9
Marks: 1

The price of a stock follows the stochastic differential equation:

$$dS(t)/S(t) = 0.028dt + 0.27dZ(t)$$

where Z(t) is a standard Brownian motion. Consider the geometric average

$$G = [S(1)S(3)S(5)]^{1/3;}.$$

Find the variance of ln G. _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 0.1539
Marks for this submission: 0/1.

10
Marks: 1

You are given:

- S(t) is the time-t price of a nondividend-paying stock.
- S(t) follows a geometric Brownian motion.
- The current stock price is 44.
- The expected return on the stock is 0.12.
- The stock's volatility is 0.22.

Calculate E[S(2)|S(2)> 44]. _____

Answer:

Make comment or override grade

Incorrect
Correct answer: 62.915419
Marks for this submission: 0/1.